

THE STATE OF NEW HAMPSHIRE

SITE EVALUATION COMMITTEE

DOCKET NO. 2015-02

APPLICATION OF ANTRIM WIND ENERGY, LLC
FOR A CERTIFICATE OF SITE AND FACILITY

PREFILED DIRECT TESTIMONY OF LISA LINOWES
ON BEHALF OF THE WIND ACTION GROUP

May 23, 2016

STATE OF NEW HAMPSHIRE

SITE EVALUATION COMMITTEE

RE: Application of Antrim Wind, LLC for Certificate of site and)
facility to construct up to 28.8 MW of wind electric generation in)
the town of Antrim, Hillsborough County, New Hampshire and)
operate the same (SEC Docket 2015-02).)

PREFILED TESTIMONY OF LISA LINOWES
PREPARED ON BEHALF OF THE WINDACTION GROUP

1. Please state your name and address for the record.

My name is Lisa Linowes, and my address is 286 Parker Hill Road, Lyman, NH 03585.

2. Please state your current employment and the position you hold.

I serve as Executive Director of the Wind Action Group (Windaction.org) a New Hampshire corporation formed in 2006.

3. Please describe your experience and general responsibilities.

I am responsible for tracking wind energy development worldwide with specific focus on the public policies driving industrial-scale wind energy development and the potential impacts on the natural environment, communities, and regional grid systems. I advise public and private entities on siting issues relative to wind energy development. I have written extensively about the economics of wind energy and the federal, state, and local subsidies that drive its deployment. I am a principal and regular contributor to MasterResource.org, a blog dedicated to analysis and commentary about energy markets and public policy. I served as the technical advisor of the award-winning documentary, *Windfall*, created, produced, and directed by Laura Israel. *Windfall* tells the story of how residents in a small community in upstate New York responded upon learning a utility-scale wind energy facility might be situated in their town.

I testified before Congress on the issue of tax subsidy programs for renewable energy and have been invited to speak on the topic of energy policy, wind energy and transmission development at numerous venues including the Environmental Markets Association regional meetings, the Northeast and Midwest chapters of the Energy Bar Association, the ISO-NE Regional System Plan meeting, and the National Association of Realtors legislative meeting.

In 2014 I moderated the Health and Safety Work Group under the NH OEP SB 99 Pre-Rulemaking Process. The group developed draft wind energy siting rules related to Health and Safety which were largely adopted by the NH Site Evaluation Committee. I have been involved in land use and zoning issues in New Hampshire for twenty years and served as a director of the NH Association of Conservation Commissions. My formal education includes a Bachelor in Science in Software Science from the Rochester Institute of Technology and an MBA from Southern New Hampshire University.

4. What is the purpose of your testimony?

The purpose of my testimony is to discuss how the Antrim Wind LLC (“AWE” or “Applicant”) application fails to satisfy the rules as adopted by the NH Site Evaluation Committee (“SEC” or “Committee”). In particular, my testimony examines how the Application does not comply with the requirements for Decommissioning, Noise and Shadow Flicker. I also examine whether the project setbacks are appropriate for ensuring public safety. Finally, my testimony discusses the economics of the project as they relate to the larger New England energy market in order to show the proposed application is not in the Public Interest.

5. What material was consulted in order to develop your testimony?

I read the application filed by Antrim Wind LLC and testimonies, the Applicant’s responses to data requests in this Docket, and portions of AWE’s application filed under Docket 2012-01. I also reviewed the NH SEC rules pertaining to wind energy siting standards.

6. In what way is the Project, as proposed, not in compliance with the NH Site rules for decommissioning?

NH Site Rules 301.08(a)(7) and 301.08(a)(8)f require that each application include a decommissioning plan with cost estimate that provides *inter alia* the removal of “all underground infrastructure at depths less than four feet below grade.” AWE’s application only provides for the removal of underground components to a depth of two feet (24 inches). *Application at Appendix 21*

While AWE has acknowledged the deficiency in its Application it has made no effort in the record to address the issue beyond asserting it “will agree to an amendment to its proposed decommissioning plan

found in Appendix 21 to require removal of all underground infrastructure to a depth of four feet where practicable.” *Cover Letter to Supplement to Application at 5*

AWE’s agreement to amend Appendix 21 at some future date does not bring the Application into compliance. Further, AWE’s casual use of the phrase “where practicable” is not supported by the rule. While an applicant may request a waiver from Site 301.08(8)(a)f, the plain language is clear that no such flexibility is automatically conveyed. If AWE needed additional time to bring Appendix 21 into compliance, the appropriate action would have been to file a motion for an enlargement in the schedule.

NH Site 301.08(a)(8)f also mandates that the decommissioning plan “shall include” the excavation and removal from the site all underground infrastructure down to 4 feet. AWE’s decommissioning plan excavates and *buries on-site* the first 24-inches of underground infrastructure. The language of the rule is clear. There is no way a reasonable person could equate 4-feet to 24-inches or the removal of debris off-site to burying the debris on-site. AWE’s claim that it “believes it has provided sufficient information to comply with the new rules” does not rise to the requirement under the rule. *Applicant’s Objection to Motion at 5 March 18, 2016*

In response to Counsel to the Public’s data request seeking a cost estimate for decommissioning the project that included removal of the debris instead of burying on site, AWE stated “the Applicant has not included ...the cost of removal of debris instead of burial on site as *it is not required under the Committee’s readopted rules and this is not common practice in the industry.*” [Emphasis added] *See Exhibit WA-03*

The time to object to the rule was in 2015. The record shows Eolian Renewable Energy LLC filed comments with the Committee¹ regarding decommissioning which were considered by the Committee along with comments by other stakeholders in the rulemaking process. It appears now that AWE intends to unilaterally ignore NH Site 301.08(a)(8)f in favor of what it alleges is ‘common practice in the industry.’ Such ‘industry practice’ should not take precedence over the detailed and deliberate investigation undertaken by the Committee when it adopted the rules.

¹ <http://www.nhsec.nh.gov/projects/2014-04/documents/09-17-15-sec-2014-04-letter-eolian-renewable-energy.pdf>

7. In what way is the Application not in compliance with the NH Site rules for noise?

First, I want to make clear that I am not an acoustician. However, I moderated the NH OEP stakeholder group that worked to develop the draft rules on wind turbine noise. These rules ultimately were adopted by the Committee under NH Site 301.18. The stakeholder meetings included regular attendance by four acousticians experienced in turbine noise measurements and predictions including experts who regularly worked for the wind industry. We arrived at the draft rules through consensus which helps explain why the Committee voted to adopt our recommendations. In areas where the attendees could not reach agreement, those areas were called out in the document submitted to NH OEP so the Committee could decide each area of disagreement on a case-by-case basis.

The stakeholder process was also governed by RSA 162-H:10-a II (4) which required the adopted rules address sound impact assessments developed in accordance with professional standards. The stakeholder group examined the professional ISO and ANSI standards governing outdoor noise monitoring and sound propagation and, with considerable input from the acousticians advising us, we were able to make the recommendations to the Committee.

NH Site rules 301.18(a)(1) and 301.18(a)(2) each reference the names and dates of the specific professional standards that were agreed to by the stakeholders. These are ANSI/ASA S12.9-2013 Part 3 and ANSI S12.9-1992 Part 2 (R2013) respectively. NH Site 301.18 (c)(1) includes, by reference, the ISO 9613-2 1996-12-15 standard to be used when conducting predictive sound modeling.

Adherence to these professional acoustical standards is a requirement of the SEC rules. In citing the standards by name and date, the Committee provides certainty for what is needed in order to comply with the rules. Such certainty is important in ensuring all parties, including acoustics experts working on behalf of the Applicant, use best practice methods and accepted measurement protocols and the results are repeatable.

Others in this proceeding will be detailing how specific sections of the professional standards were not followed by Robert O'Neal, of Epsilon Associates, Inc. However, I can speak to the less technical areas of the noise rules that were not followed. Below is a list of issues I identified.

- a) NH Site 301.18(b)(1), requires the report include the “layout of the project area, including topography, project boundary lines, and property lines.” Mr. O’Neal’s report includes the project layout, boundary lines and topography but excludes all other property lines.
- b) NH Site 301.18(b)(8) requires that the report identify the measured “A-weighted and C-weighted sound levels for L-10, Leq, and L-90.” Mr. O’Neal includes this information but also speciously includes unneeded, extraneous figures as maximum, median, and average figures without comment or explanation thus opening them up for confusing the lay reader as to their significance. This extraneous material appears to be included to dilute the impact of the low sound levels measured in Antrim for periods when transient and local sounds are not present i.e. the minimum L90, Leq and L10 values.
- c) NH Site 301.18(c)(4) requires disclosure of all other corrections that apply to the model algorithm. Mr. O’Neal’s predictions represent sound levels that might occur under the limited meteorological conditions specified in the ISO 9613-2 standard (Clause 5 of ISO 9613-2 i.e. calm or only a mild downwind condition). Mr. O’Neal does not specify in his report how winds above 2 m/s or other more turbulent atmospheric conditions could cause wind turbine noise to be higher and yet not masked by other environmental sounds. He also omits the +/- 3 dB correction (Clause 9 of ISO 9613-2).
- d) NH Site 301.18 (c)(3) requires predictions be made at all properties within 2 miles of the turbines. Mr. O’Neal’s supplemental material omits at least 5 properties that he otherwise included in his October 2015 report. *See Table 1* There is no explanation for why these properties were removed. At least three of these properties were modeled to show noise levels above the worse-case cited in Mr. O’Neal’s report, including locations #24 and #21 with predicted noise levels at 40 dBA. The SEC rules do not distinguish between participating and non-participating landowners.

Table 1

ID	Structure	Name	Address
21	House	OTT MICHAEL JAMES HUTCHINS	354 KEENE road
24	Hunting-Camp	COUTURIER MARCEL J	344 KEENE road
80	Hunting-cabin	MICHELI LYLE J & ANNE J	SALMON BROOK road
94	Camp	WHITTEMORE ETAL ARTHUR F	103 CAMP ROAD - PVT RD 38
95	Camp	WHITTEMORE ETAL ARTHUR F	103 CAMP ROAD - PVT RD 38

- e) Finally, a separate model for predicted sound emissions from the substation was omitted from the 2016 report. The substation, which is a separate component of the project, has very different acoustic characteristics as compared to other aspects of the Project. Given the likelihood of pure tone sound emissions, the substation may be subject to noise penalties required in Site 301.18(h). Mr. O’Neal failed to appropriately account for a pure tone emanating from the substation. This is especially important given that the substation appears to be the closest noise source to any home.

8. In what way is the Application not in compliance with the NH Site rules for shadow flicker?

SEC Rule 301.08(a)(2), requires each application to include a shadow flicker assessment “that identifies the astronomical maximum as well as the anticipated hours per year of shadow flicker expected to be perceived at each residence, learning space, workplace, health care setting, outdoor or indoor public gathering area, other occupied building, and roadway, within a minimum of 1 mile of any turbine, based on shadow flicker modeling that assumes an impact distance of at least 1 mile from each of the turbines.”

The updated shadow flicker assessment is not compliant with the SEC amended rules for the following reasons:

- a) AWE’s assessment for shadow flicker removed the properties from his 2015 report as were removed from his predicted noise results. *See Table 1 above.* No explanation is provided for why these properties were eliminated from the assessment or what changed since October 2015.
- b) The definition of “Astronomical Maximum” in the February 17, 2016 shadow flicker report is not compliant with the definition in NH Site 102.11. Mr. O’Neal’s definition does not establish that the “rotor-plane of the turbine is always perpendicular to the sun.” It is important that the model implemented the correct use of Astronomical Maximum. *Attachment 6 at 4-1*

- c) NH Rule 301.08(a)(2) sets a minimum impact distance for shadow flicker of 1 mile, however, AWE's model assesses shadow flicker only up to 1-mile. The model simplistically assumes that properties just beyond 1-mile will experience no shadow flicker. This is flatly wrong, and we can demonstrate this by comparing the results of Mr. O'Neal's shadow flicker analysis filed with the Application in October 2015.

The prior analysis used an impact distance of 1,130 meters (3,707 feet) while the newly adopted Site rules require an analysis out to a minimum impact distance of 1-mile. See *Table 2 below*.

The data in the first four columns were taken from Mr O'Neal's Attachment 6, Table 5-1. The data in the last column are from Mr. O'Neal's Appendix 13b submitted on October 2, 2015. The table shows the hours of shadow flicker at the same receptors when the model was run using different impact distances. The results are decidedly different even at receptors that were within the smaller (1,130 meter) impact area. There is no information in the report indicating a change in the model's assumptions other than impact distance. It would appear that the results could be different again had the methodology complied with SEC NH Rule 301.08(a)(2).

During the rulemaking proceedings, the Committee received public comment from Mary Reilly, Zoning and Building Director for Mason County, Michigan where Ms. Reilly explains² that that the county measured shadow flicker at homes situated more than a mile from the turbines and that "using a 1 mile limit (or up to 2 KM) will produce more realistic modeling results." Shadow flicker modeling can assess distances out to 2 KM.

² <http://www.nhsec.nh.gov/projects/2014-04/documents/09-15-15-sec-2014-04-letter-mason-county.pdf>

Table 2

ID	X (Easting)	Y (Northing)	SFlicker to 1-mile (hh:mm)	SFlicker to 1130m (hh:mm)
87	269742.58	61387.33	13:48	0:00
86	269749.54	61392.46	13:42	0:00
4	271565.96	63747.81	13:38	10:10
3	271549.49	63740.04	13:18	9:23
5	271538.09	63766.01	12:55	9:29
6	271527.52	63771.85	12:47	9:19
77	270088.73	62000.89	12:05	0:00
64	273380.77	62733.32	11:42	4:08
65	273391.93	62742.55	11:13	4:01
85	271491.33	63836.9	10:44	8:46
2	271199.03	63480.59	10:28	3:35
114	273438.58	62762.08	9:53	3:32
58	273227.8	63238.36	9:49	7:34
63	273360.41	62895.16	9:41	3:35
66	273417.14	62477.48	9:09	6:44
57	273296.81	63344.24	8:35	3:12
62	273347.28	63110.39	8:33	3:07
59	273319.69	63284.01	8:22	6:21
56	273313.64	63381.73	8:21	0:00
60	273330.44	63262.55	8:17	3:06
67	273192.25	62054.82	8:12	0:00
146	273353.68	63183.49	8:12	3:03
61	273342.62	63248.34	8:11	0:00
34	273302.32	63643.97	8:02	0:00

9. Do you have any concerns regarding the setback distances between the turbines and surrounding properties?

Yes. In examining the distances between the turbines and abutting property owners, it is clear that at least four properties are too close to turbines 1-4 such that appropriate safety zones around each of these turbines would include portions of the adjacent properties. In at least one case, one turbine (#4) appears to be only 540 +/- feet from the nearest a property line. Turbine #1 appears to be just 990 feet from two property lines and turbine #3 is about 1100 feet from an adjacent property line. Turbines #6-9 are also

very close to adjacent properties with the shortest distance appearing to be just 330 feet. If these turbines are elevated above the abutting properties the apparent distance will be much shorter.

AWE tacitly dismisses these short distances by claiming one property is a vacant lot, one property has a signed waiver, and the third, at just 1.1 times the blade tip height or 540 feet, "is consistent with industry practice employed to protect abutting properties from ice throw risk." *New Hampshire Site Evaluation Committee Application of Antrim Wind Energy, LLC at pg 112* Ice throw is a dangerous concern around operating turbines, particularly in climates similar to New Hampshire ridgelines which are conducive to forming ice even in the summer months.

Project developers often represent that operating wind turbines are equipped to sense any imbalance in the system due to ice build-up and shut-down, however, this is not always the case. According to Seifert et.al³:

"There is significant evidence that rime ice continues to form when the turbine is operating and is not shaken off by blade flexing, even though this may be the case for other types of ice formation. Also, rime ice formation appears to occur with remarkable symmetry on all turbine blades with the result that no imbalance occurs and the turbine continues to operate."

GE Wind⁴ states that rotating turbine blades may propel ice fragments up to several hundred meters if conditions are right depending on turbine dimensions, rotational speed and many other potential factors. Estimates of icing risk are also reliant on the number of days in a year when ice events might occur. If we apply the commonly used safety distance rule for icfall from an operational wind turbine (*see below*), the setback distance to avoid the Siemens turbines from shedding ice on abutting properties would be just over 309 meters or just over 1000 feet. Industry experts have reported that their simulations and observations have shown that the actual safety distance is both longer and shorter.

³ Morgan C., Bossanyi E., Seifert H., "Assessment of Safety Risks Arising From Wind Turbine Icing" 31 March - 2 April 1998, Hetta, Finland http://arcticwind.vtt.fi/boreasiv/assessment_of_safety.pdf

⁴ http://site.ge-energy.com/prod_serv/products/tech_docs/en/downloads/ger4262.pdf

Safety distance = 1.5 * (H+D)

where H = hub height of wind turbine

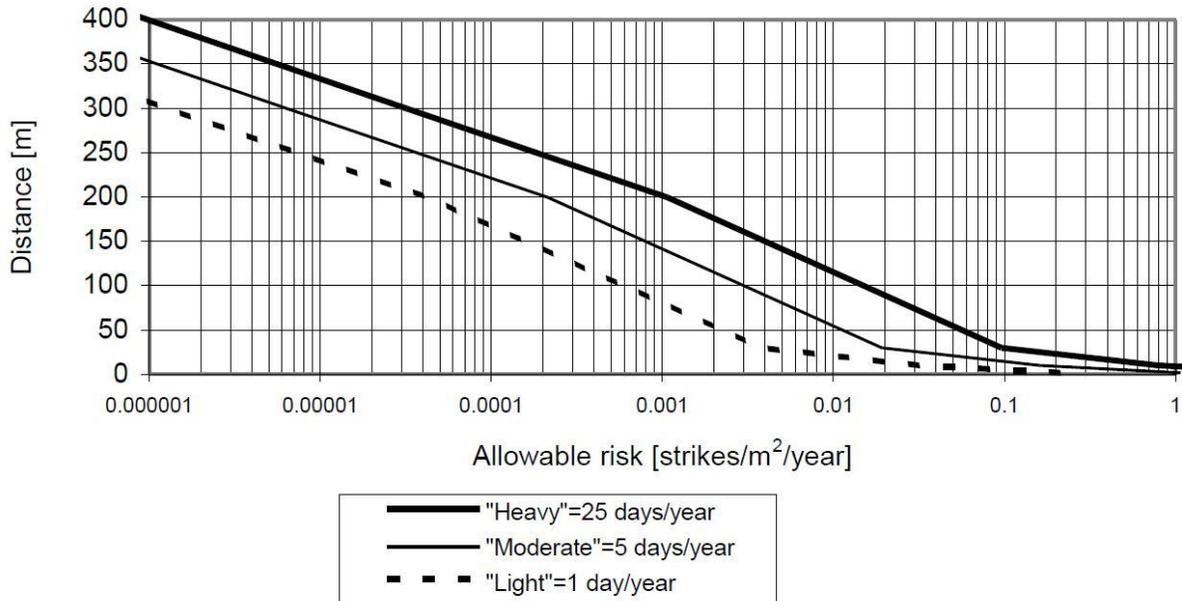
D = rotor diameter

Turbine model: SWT-3.2-113 3.2

Hub Height: 92.5 meters (WTG #1-8)

Rotor Diameter: 113 meters

According to meteorologist Dr. Fred Ward, there is a lack of icing data for elevated structures on hills and ridges in New Hampshire other than for Mount Washington. Rime icing is elevation dependent and there may be additional effects due to wind flow over isolated peaks. As more turbines are sited in cold climates, the wind industry has considered safety distances based on the level of allowable risk. The figure below maps safety distances from the turbines based on the estimated annual icing events at the project site and degree of risk.



Very little public information is available that documents the frequency of ices throw and the distances flung from the turbines. Surveys have been conducted of large project operators in an effort to track the size and distance of ice fragments being thrown but the results are inconclusive as there is no way to assess how well the area around the turbines was searched, especially at great distances from the towers.

10. Are there other safety concerns other than ice throw?

Yes. AWE asserts in its Application that “Tower collapse and blade throw incidents are extremely rare, are primarily associated with the early years of modern wind power production, and currently represent minimal danger to public health and safety.” *Id.* This statement is not borne out by the facts. Since 2008 there have been at least eight (8) *reported* catastrophic turbine failures in the Northeast alone. In one instance a blade was tossed nearly 500-feet from the base of the turbine. Three instances involved turbine collapse and in another four the turbines caught fire. In all but one case, the turbines involved represented new technology.

LOCATION ⁵	DATE	FAILURE
Fenner, NY	Feb-16	Blade Throw
Searsburg, VT	Aug-15	Fire
Fenner, NY	Oct-14	Fire
Kibby Mountain, ME	Apr-13	Fire
Altona, NY	Jan-12	Fire
Fenner, NY	Dec-09	Collapse
Altona, NY	Mar-09	Collapse
Searsburg, VT	Sep-08	Collapse

The problem is that not all turbine failures are reported.

During the Granite Reliable Power proceeding (*SEC Docket 2014-03*), John R. Cyr, Operations and Maintenance Supervisor for the project, testified that anticipated turbine failures could include lightning strikes and ice damage to the blades. In the summer of 2014, the turbines on Mount Kelsey had sixteen lightning strikes. (*Transcript at 55-56 Nov 24, 2014*). In the period from 2013-2014, an estimated 50-60 lightning strikes were logged for the entire project (33 turbines). (*Transcript at 57 Nov 24, 2014*) When asked the likelihood of a blade failure due to lightning, Mr. Cyr stated “Well, you know, we’re talking

⁵ This list is not exhaustive but represents high-profile failures in the region. Links to events provided below:
NY: <http://www.windaction.org/posts/44335-113-foot-blade-falls-off-fenner-windmill-bolt-failure#.V0DIVpErIuU>
VT: http://www.dvalnews.com/view/full_story_obits/26804967/article-Fire-from-windmill-seen-from-Route-8?instance=home_news_left
NY: <http://www.oneidadispatch.com/general-news/20141025/windmill-catches-fire-in-fenner>
ME: <http://bangordailynews.com/2013/04/23/news/mid-maine/regulators-advocates-opponents-of-wind-energy-take-sides-after-fire-destroys-a-4-million-turbine-at-maines-largest-wind-farm/>
NY: http://www.pressrepublican.com/news/local_news/wind-turbine-fire-under-investigation/article_2fe0d7c4-193b-5989-a01c-5388f1bdf076.html
NY: <http://www.uticaod.com/x1671988110/Safety-oversight-lacking-at-turbine-collapse-site>
NY: <http://www.wptz.com/Images-Surface-In-Turbine-Collapse/5777900>
VT: <http://www.rutlandherald.com/apps/pbcs.dll/article?AID=/20081015/NEWS04/810150400/1004/NEWS03>

about Mother Nature here. This is weather. This is lightning. You can't predict lightning, or I can't predict lightning. ...I don't know anybody that can predict where lightning is going to hit, and what the extent of the damage will be." (*Transcript at 58 Nov 24, 2014*).

Fire suppression systems installed in the nacelles assist in delaying fires so emergency crews can arrive but the risks to nearby properties are still present.

The wind industry is well aware of the safety concerns. The WindAction Group and New Hampshire Wind Watch filed joint comments with the SEC in March 2015 that included the following relevant industry and New Hampshire specific documents pertaining to turbine safety and setback distances. These same sources, and others were discussed in the SB-99 Health and Safety section of the OEP stakeholder document.

- a) **Vestas**, *Mechanical operating and maintenance manual V90-3.0MW turbine*,
<http://www.windaction.org/posts/15632-vestas-mechanical-operating-and-maintenance-manual-v90-3-0mw-turbine#.VQ3KBxrF98E>

Do not stay within a radius of 400m (1300 ft) from the turbine unless it is necessary. If you have to inspect an operating turbine from the ground, do not stay under the rotor plane but observe the rotor from the front. Make sure that children do not stay by or play nearby the turbine. If necessary, fence the foundation.

- b) **Nordex Energy GmbH**, *Rules of Conduct on, in and around Wind Turbines Turbine Classes K06, K07, K08 All Types*
<http://s3.amazonaws.com/windaction/attachments/2351/NordexSafetyManual-c.pdf>

Falling Turbine Parts - In case of a fire in the nacelle or on the rotor, parts may fall off the wind turbine. In case of a fire, nobody is permitted within a radius of 500 m (1640 feet) from the turbine.

- c) **Volkswind GmbH**, *Planning your Wind Farm*,
<http://www.volkswind.de/en/wind-farm-development/planning.html>

Volkswind would evaluate whether your land is appropriate for one or more wind turbines. For a fast & reliable evaluation you might refer to the following parameters:

- Setback at least 1000 meters (3281 feet) from occupied houses
- Outside the boundaries of protected or conservation areas

- d) **GE Energy, *Ice Shedding and Ice Throw – Risk and Mitigation***,
http://site.ge-energy.com/prod_serv/products/tech_docs/en/downloads/ger4262.pdf

Rotating turbine blades may propel ice fragments up to several hundred meters if conditions are right depending on turbine dimensions, rotational speed and many other potential factors.

- e) **Iberdrola/Groton Wind LLC, *Environmental Health and Safety Plan***,
http://www.nhsec.nh.gov/projects/2010-01/documents/131011safety_plan.pdf

Ice that has formed on a wind turbine typically sheds as the air temperatures rises [sic]; however, cases have been documented when ice shedding occurred without a temperature rise. Shedding ice may be thrown a significant distance as a result of the rotor spinning or wind blowing the ice fragments. Icing of blades is a significant issue that during "shedding" poses a risk of injury or property damage. Everyone is reminded that at any time when "icing" may potentially occur there is no replacement for using constant vigilance in assessing your surroundings.

- f) **Will Staats, NHF&G, *Testimony before Vermont Committee***,
<http://www.windaction.org/posts/36424-testimony-of-will-staats#.VQ3I1BrF98E>

The danger of ice throw cannot be over emphasized. I have often worked near these turbines on our research projects in the winter and witnessed the large divots in the snow where ice has been flung from the turning blades. On one terrifying occasion, my truck was struck by flying ice that, had it hit me or anyone else close by, could have killed or caused serious injury. One operator of a wind installation told me these machines will throw a *four hundred pound chunk of ice one thousand feet*. [Emphasis added]

During the rulemaking process, the Committee decided to not define specific setback rules leaving the Committee free to address safety factors or other types of mitigation through certificate conditions. I support this decision but would add that the absence of a setback standard does not mean turbines can be safely sited close to property lines, roads, or areas where people gather.

Finally, wind turbine safety distances that extend onto private properties as would be the case should AWE proceed with the project, may risk rendering portions of nearby properties unsafe for further development. Local building departments might refuse to grant building permits in the setback zone and homeowner insurance companies could refuse to insure structures. The SB-99 Health and Safety Stakeholder group agreed that safety zones around the turbines should not encompass portions of properties, public roads or public gathering areas⁶.

⁶ #7 in Table 3.a of the SB-99 Stakeholder Document

11. Have you considered whether AWE has satisfied the financial, managerial and technical assurances required under RSA 162-H?

Yes. RSA 162-H:IV(a) requires an applicant demonstrate that it has the financial, managerial and technical resources to construct, operate and maintain the project in accordance with the permit.

AWE describes itself as a Delaware Limited Liability Company formed in 2009 where all of the membership interests in AWE are owned by Walden Green Energy, LLC ("Walden"), through its two wholly owned subsidiaries Walden Green Energy Northeast Wind LLC ("Walden NE") and Walden Antrim LLC ("Walden Antrim"). *Application Supplemental 2 Prefiled Testimony of Jack Kenworthy March 3, 2016 at 3, 4*

Walden has stated that it will provide 100% of the construction equity when backed by RWE. Walden will also be seeking a construction loan with one or more lenders, but the application offers no concrete information in support of obtaining such financing beyond two non-binding, largely pro forma letters, each dating back more than a year ago from lenders BayernLB and Keybank. The Keybank letter submitted by AWE is essentially identical to Keybank letters offered in other states, including Maine and Minnesota,^{7,8} for other wind projects proposed by different developers.

AWE's Application and testimonies assert that when the project reaches its commercial operation date "a tax equity investor will come in and replace part of the construction loan." *Application Supplemental 2 Prefiled Testimony of Henry Weitzner and Eric Shaw March 3, 2016 at 7* RSA 162H requires the showing of financial support prior to construction, not prior to the commercial operation date. Moreover, the federal production and investment tax credits (PTC/ITC) are set to begin phasing out on January 1, 2017. AWE casually states that if the "assumptions or actual conditions change with respect to the PPA or other factors, Walden's equity contribution and resulting overall structure will be adjusted accordingly." *Id. at 9* That is a brave statement for a wind project that may be facing the prospect of a PTC/ITC reduced by

⁷ Keybank Letter pertaining to Comfrey Wind Energy project proposed for Minnesota.
<https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7B61C6671D-0B1E-4B50-B30B-218538861777%7D&documentTitle=20156-111484-01>

⁸ Keybank Letter pertaining to First Wind Bowers Wind Project proposed for Maine.
https://www1.maine.gov/dacf/lupc/projects/windpower/firstwind/champlain_bowers/Development/Application/Exhibit_2B.pdf

20%. While AWE has previously asserted the project can be built without the wind PTC/ITC, there is strong industry evidence that this project will not proceed without the full federal subsidy, especially given the high cost of construction in New England and the variability of the wind resource.

The Application is notable, as well, for other significant omissions. There are no income or cash flow statements for Antrim Wind LLC or Walden Green Energy nor is there any explanation as to whether and to what extent the project and/or its immediate owner, Walden Green Energy, will have access to RWE's resources. RWEST, we are told, is a wholly owned subsidiary of RWE AG. But there also appears to be an added "LLC layer" known as RWEST PI Walden Holding LLC which, according to Buzzfile, has been operating for about a year with estimated annual revenues of \$55,000 and employs approximately 1 person. *See Exhibit WA-01* We take no issue with creating protective financial layers between the project and RWE AG, however, given how AWE repeatedly promotes its financial connection with RWE AG as proof of its financial capability, there is no information in the record to show the level of commitment, nor can we understand from the record whether the project or Walden has recourse to RWE AG.

AWE provided a June 30, 2015 unaudited statement of assets and liabilities that shows working capital (current assets net of current liabilities) of just \$62,622. In an updated sheet supplied to the parties through a data request by Counsel for the public, the working capital as of March 31, 2016 rose to \$1.3 million. *Exhibit WA-03* While the number is higher, it is still well below the amount needed to demonstrate financial capability.

The application and supplemental information also do not show that Antrim Wind LLC or Walden Green Energy has experience in wind energy development. The public list of projects in which Mr. Weitzner, Mr. Manahilov, and Ms. Valdovinos, Mr. Shaw, Walden Green Energy, LLC, Walden Renewables, LLC, and RWE Supply & Trading, has an interest or for which it or he or she is involve pertain to solar, hydro, LNG, oil, STEM Electricity storage, and biomass resources. *Exhibit WA-03* Solar was the only fuel resource in New England. AWE and Walden tout future contracts with Siemens and Reed & Reed but ultimately Siemens and Reed & Reed are paid to supply products and services. The responsibility for project construction and operation ultimately falls to AWE and Walden and there is no information in the record that either has experience with a project like this.

12. Have you considered whether AWE will be able to sell its energy to the market?

Yes. It is evident from AWE's application and testimonies that securing a long-term PPA is of singular import to the project's viability. However, it is not certain that all of the project output will be placed under contract. On May 17, AWE notified the Committee and the Parties that it had entered into a long-term (20 year) agreement with New Hampshire Electric Cooperative ("NHEC") to sell 25% of the project's production (about 7 MW) and renewable energy credits (RECs) but the terms of the agreement were not disclosed.

Finding a buyer for the other 75% may not be as straightforward given the current market for renewable energy in New England and based on the public pro forma supplied by AWE. *See Exhibit WA-02*

According to the pro forma, AWE is anticipating an aggregate contract price of about \$81 per megawatt hour ("mwh") for the first 10 years of operation. The pro forma assumes an average annual capacity factor of 37%, which is at the very highest level of what New England wind facilities have achieved and above any project operating in New Hampshire. While it is possible that newer turbine technology might deliver better capacity factors much will depend on the quality of the wind resource at the site and possible mitigation requirements imposed due to noise and environmental concerns. Other projects in the Northeast that made similar claims of high production levels delivered only marginally better output than existing facilities.

Nevertheless, the \$81/mwh bundled price is well above what the market is likely to bear today. In late 2013, four Massachusetts utilities agreed to pay under \$80/mwh over 15 years for wind energy. Since that time, the market for energy has changed dramatically.

First, the \$81/mwh price does not assume a realistic REC price forecast. Second, energy prices are much lower due to natural gas prices which have decreased dramatically since 2013 and continue to drop. New England generation is heavily dependent on natural gas, and the New England electric market price is highly correlated with that of natural gas. Adjusting for other factors such as pipeline delivery costs, I calculate that current forecasts for natural gas prices⁹ have lowered the base energy price forecast

⁹ Henry Hub source - <http://www.cmegroup.com/trading/energy/natural-gas/natural-gas.html> (Accessed pricing data on May 18, 2016)

conservatively to around \$39/mwh. This estimate includes RGGI pricing of \$10/allowance but does not include REC pricing.

Turning to the REC market, Class I renewable resources have enjoyed a premium in the New England energy market for many years but since 2013 there have been significant changes.

In 2015, the State of Connecticut finalized contracts to purchase 250 MW from the proposed Number Nine project in Maine as well as another 20 MW of a solar project, again for a price of less than \$80/MWh. These lower priced contacts were competitively bid at a time when REC prices were much higher than they are today and New England was coming off a difficult winter where power prices soared well above forecasted levels.

In recent years, the market price for Class I RECs has ranged from as low as \$10/MWh to a high of just less than \$63/MWh. Since the value of a renewable energy credit can represent a significant portion of the contracted price depending on available supply, accurate forecasting of REC values is important in determining a contract price that will promote the general good of the State of New Hampshire.

Since December 2014, New England Class I RECs have been valued at or slightly under \$50. By January, 2015, we saw Class I prices drop to as low as \$48 following the Connecticut PURA's draft decision that found Vermont SPEED resources did not trigger a claim under Conn. Gen. Stat. § 16-1(a)(20). This ruling freed Vermont RECs to be sold without risk of a title challenge. Currently, New England is experiencing a surplus of Mass Class I and RI New RECs for 2015-16 which is depressing Class I REC prices. Prices for 2015 REC are now under \$25. This is principally due to the Massachusetts' solar carve-out which is reducing the Commonwealth's Class I percentage.

Prices will recover as the region's mandates incrementally grow, but other factors will keep REC prices well under the alternative compliance penalty price (ACP) and substantially lower in the 2020s.

Beginning in 2016 wind projects in New York State will start to come off their contracts with NYSERDA. New England REC values, even at prices well below the ACP, are still significantly above NYSERDA's contract prices and we can expect an inflow of wind energy and RECs into New England. By 2019 as many as 3 million RECs could find their way into the New England market from New York

which will further depress Class I REC values. Nearly all of the New York wind projects are already qualified as Class I resources in Massachusetts and other New England states.

A large influx of New York wind energy is likely to lead to an oversupply of RECs relative to demand. Since imports also require the energy to be scheduled in, New York wind will be imported as system power which will contribute to the suppression of energy prices in the ISO-NE's Day-Ahead Market.

Future REC prices will also be impacted by the sunset of New England's RPS policies. Rhode Island's New RPS will plateau at 12.5% by 2019, Connecticut's Class I RPS will reach 20% by 2020 and New Hampshire Class I will reach 15% (including Class I thermal) in 2025. Unless drastic changes to the existing New England RPS policies are adopted in the next few years, which is something I do not anticipate, incremental growth in Class I REC demand will shrink by the end of this decade. Much of the new growth will be satisfied with new wind resources now under development in Maine as well as wind RECs and energy imported from New York or elsewhere. Further, as Massachusetts continues to encourage distributed solar up to 1,600 MW, we can also expect to see incremental demand for Massachusetts Class I RECs to be satisfied with substantial amounts of in-state solar.

As evidence of this, we looked at the April 20, 2016 RFP¹⁰ issued by Eversource in search of RECs to satisfy its Massachusetts RPS obligation. The below table taken from the RFP defines the vintage and class of RECs the utility is seeking. There are no 2015 RECs even though the compliance year is still ongoing until June. But more to the point, no Class I RECs are listed which means Eversource is not looking for any wind RECs in 2016. This would mean that Eversource has already satisfied its 2016 obligation for MA Class I RECs. This opens the door for these RECs to flow back into NH for compliance and 2016 RECs are likely to remain depressed.

Year	Class I	Class I- Solar	Class I- Solar II	Class II	Class II Waste Energy	APS
2016		37,000	18,000	74,000	94,000	111,000

¹⁰ [https://www.eversource.com/Content/docs/default-source/ee/request-for-proposal-for-massachusetts-renewable-energy-certificates-\(final\).pdf?sfvrsn=0](https://www.eversource.com/Content/docs/default-source/ee/request-for-proposal-for-massachusetts-renewable-energy-certificates-(final).pdf?sfvrsn=0)

13. How is this information useful in examining AWE's project?

The Committee is tasked with evaluating the financial viability of the company and whether the project will serve the public interest. Since there is no financial information about the company in the record that we can examine, and since we know AWE is placing significant weight on its ability to secure a long term power purchase agreement for the project's output, it is prudent to examine the pro forma in light of New England's renewable energy market.

AWE is seeking an aggregate price for energy and RECs that is much higher than what the market will bear today given the significant erosion in energy and REC prices. Further, AWE cites expenses in its pro forma of \$20/mwh which appear to be much higher than what we are seeing in North American for onshore wind projects. These together suggest the project will be overpriced relative to other Class I resources in the region that are either under construction or already existing. AWE has filed a letter with the SEC claiming a contract has been signed to sell 25% of the energy and RECs to NHEC over the next 20 years. If this contract is signed at the pro forma rate of \$81/mwh, NHEC ratepayers could be paying as much as \$20/mwh over the long-term average market price which for the first 10 years could cost an additional \$4.7 million over market rates. The cost above market for the 100% output would be \$18.7 million.

If the market drives AWE to negotiate lower prices, that would be a benefit to New Hampshire ratepayers and others in the region. However, a lower negotiated price could raise doubts about the project's financial viability. In light of this, it would not be prudent for the Committee to simply establish a condition in the certificate that all financing be in place before construction. New Hampshire ratepayers deserve to understand the cost this project will impose on them and the residents of Antrim deserve to know if the project will actually happen or worse, could be abandoned.

14. Does this conclude your testimony?

Yes, with one closing caveat. If the Committee orders Antrim Wind to share its financial data with the parties, including under a protective order, it is my hope that the Committee will permit me to update my testimony to address the new information.

EXHIBIT WA-01

Rwest PI Walden Holding LLC

Action ▾



Contact Information

Rwest PI Walden Holding LLC
1095 Avenue of the Americas
New York, NY 10036

Contact: Brett Bucci
Title: Principal
Phone: 212-852-4600
Website:

There are **74** Companies located at 1095 Avenue of the Americas, New York, NY 10036

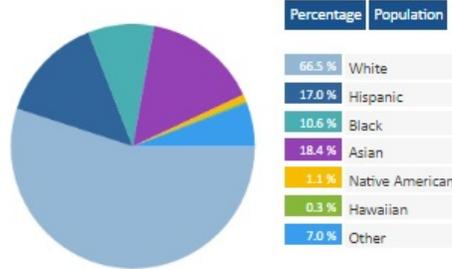
Business Description

Rwest PI Walden Holding is located in New York, New York. This organization primarily operates in the Generation, Electric Power business / industry within the Electric, Gas and Sanitary Services sector. This organization has been operating for approximately a year. Rwest PI Walden Holding is estimated to generate \$55,000 in annual revenues, and employs approximately 1 people at this single location.

Sector: Electric, Gas and Sanitary Services
Category: Electric Services
Industry: Generation, Electric Power
SIC Code: 4911

Name: Rwest PI Walden Holding LLC
Year Founded: 2015
Location Type: Single
Revenue: \$ 55,000
Employees: 1
Facility Size: N/A
** Revenue & Employees are estimates*

Demographics for Zipcode 10036

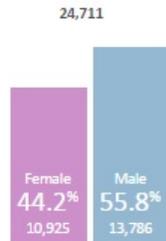


Map



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Population



Median Age



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Similar Companies Nearby

Name	Employees	Distance (mil)
Terra-Gen Power Holdings, LLC	1	0.0
Rwest PI Walden 1 LLC	1	0.0
Alta Wind XIII, LLC	25	0.0
Terra-Gen Power, LLC	90	0.0
Alta Wind II, LLC	26	0.0
Coso Hot Springs Intermountain Power Inc	1	0.1
District Energy Midwest Sub LLC	11	0.2
Blue Mountain Renewables LLC	1	0.3
Bmr Energy LLC	6	0.3
K Road Modesto Solar LLC	1	0.3

Nearby Resources



Public Records: Online Status: Active

This site contains REAL police records (court records of driving citations, speeding tickets, felonies, misdemeanors, offenses, mugshots, etc.), background reports, court documents, address information, phone numbers, and much more.

Enter Site

Questions & Answers

- Q** Is there a key contact at Rwest PI Walden Holding?
A Brett Bucci is the Principal at Rwest PI Walden Holding. You can contact Brett at (212) 852-4600.
- Q** How big is Rwest PI Walden Holding?
A Rwest PI Walden Holding is estimated to generate \$55,000 in annual revenues, and employs approximately 1 people at this location.
- Q** What is the phone number for Rwest PI Walden Holding?
A The phone number for Rwest PI Walden Holding is (212) 852-4600

More ▾

Statistics for Zipcode 10036

Average House Value	\$ 798,600
Average Household Income	\$ 62,997
Number of Households	15,183
Persons per Household	1.59

Number of Businesses	8,287
Number of Employees	142,385
Land Area (square miles)	0.443
Water Area (square miles)	0.000

EXHIBIT WA-02



Pro forma – Antrim Wind
PUBLIC

Project Pro Forma

- **Revenue** is based on PPAs currently under negotiation for long term energy and RECs. Revenue also includes capacity payments that have been allocated to AWE.
- **Expenses** consists of operation and maintenance, lease payments, insurance, and state and local taxes.
- **Taxes:** The Project benefits from MACRS accelerated depreciation. The Project can monetize either the PTC or ITC. Current assumption is to monetize the ITC.

<i>(in \$'000)</i>	Year 1-10	Year 11-25
Electricity production (MWhr)	933,466	1,400,198
Revenue	<u>75,476</u>	<u>108,532</u>
Expenses	<u>(18,617)</u>	<u>(34,155)</u>
EBITDA	56,859	74,377
Depreciation	(63,413)	(1,212)
ITC	19,387	
Federal Taxes	<u>2,755</u>	<u>(28,534)</u>
After-tax cash flow	79,001	45,843

Permanent financing – capital structure

- The project construction will be funded with a \$50-55 million construction loan
- At COD, a tax equity investor will capital will replace a portion of the construction loan
- The below structure is the permanent capital structure once the project is placed into operation

Source	Amount	Expected repayment
Bank debt	26 mm	10-12 years
Tax equity	28.5 mm	6-8 years
Common equity	<u>11 mm</u>	
Total project cost	65 mm	

EXHIBIT WA-03

PC 1-5: Please describe in detail every other project in which Mr. Weitzner, Mr. Manahilov, and Ms. Valdovinos, Mr. Shaw, Walden Green Energy, LLC, Walden Renewables, LLC, and RWE Supply & Trading, has an interest or for which it or he or she performs any services or has any management responsibilities. Include size, location, development stage, leases and permits obtained, whether a power purchase agreement is in place, position on ISO queue, status of ISO review, amount invested, total estimated cost of project, estimated date of commercial operation, and whether there is any litigation pending or resolved.

Response: The following is a list of other projects in which Mr. Weitzner, Mr. Manahilov, and Ms. Valdovinos, Mr. Shaw, Walden Green Energy, LLC, Walden Renewables, LLC, and RWE Supply & Trading, has an interest or for which it or he or she is involved. Due to the volume of projects in which RWE Supply & Trading is involved, the list provided below is a representative list of projects and investments completed by RWE Principal Investments in the past 5 years:

- a. Henry Weitzner: Whitcomb Solar Project in Vermont; Hubbardston Solar Project in Massachusetts; Palmer Solar Project in Massachusetts; CC Power 2 Solar Project in Massachusetts; Liberty Solar Project in Massachusetts; and Charles River Quad, Brandeis University Solar Thermal Project in Massachusetts.
- b. George Manahilov: Whitcomb Solar Project in Vermont; Imaret Dere 1 Hydro Project in Bulgaria; Selci 1 Solar Project in Bulgaria; and Selci 2 Solar Project in Bulgaria.
- c. Sarah Valdovinos: Vergennes Solar Project in Vermont.
- d. Eric Shaw/RWE: REV LNG Project in Pennsylvania; Conergy Solar EC Project in Germany; First River Oil Project in Texas, Oklahoma, and Louisiana; STEM Electricity Storage in California; Lynemouth Biomass Project in the United Kingdom; and Kencot Solar Project in the United Kingdom.

For additional information on the projects listed above, please see the spreadsheet attached as PC 1-5. The attached spreadsheet does not contain any confidential information. Counsel for the Public will be provided with a version of the attached document which does contain confidential information, subject to a request for confidential treatment. AWE will be filing a Motion for Protective Order and Confidential Treatment, which will seek confidential treatment of these materials.

PC 1-20: Please provide a cost estimate for decommissioning the project that includes removal of all underground infrastructure at depths of four feet, and the removal of the debris instead of burying on site. Provide copies of all documents relating to decommissioning including any necessary permit applications.

Response: Attached is an updated estimate for decommissioning the Project that includes the removal of all underground infrastructure to depths of 4 feet, attached as PC 1-20. The Applicant has not included in the attached estimate for decommissioning the cost of removal of debris instead of burial on site as it is not required under the Committee's readopted rules and this is not common practice in the industry.

Antrim Wind Energy LLC
Statement of Assets Liabilities
As of March 31, 2016

	<u>Mar 31, 16</u>
ASSETS	1,417,475.89
LIABILITIES	119,961.43